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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
DAY, HERNG DER	
ART UNIT	**PAPER NUMBER**
2128	

DATE MAILED: 01/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/660,026	CHOWDHURY ET AL.	
	Examiner	Art Unit	
	Herng-der Day	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8/10/04, 11/14/04, and 11/22/04*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,20 and 21* is/are rejected.

7)☒ Claim(s) *7-19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 November 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *11122004, 12222004* .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to Applicants' Amendment ("Amendment 1") to Office Action dated April 7, 2004, mailed August 6, 2004, and received by PTO August 10, 2004, Applicants' Supplemental Amendment ("Amendment 2"), faxed November 14, 2004, and Applicants' Second Supplemental Amendment ("Amendment 3"), faxed November 22, 2004.

1-1. Claims 1, 10, 14, 20, and 21 have been amended. Claims 1-21 are pending.

1-2. Claims 1-21 have been examined. Claims 1-6, 20, and 21 have been rejected.

Drawings

2. The proposed drawing corrections to FIG. 4 received by PTO on November 14, 2004, have been approved. The objection to the drawings has been withdrawn.

Abstract

3. The Examiner has acknowledged without objection that the abstract has been amended.

Specification

4. The objections to the specification have been withdrawn.

Claim Objections

5. The Examiner has acknowledged without objection that claim 21 has been corrected.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 2-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7-1. Claim 2 recites the limitation "determining the history to be additionally comprised of a propagation of a tag value of each signal of the second subset" in lines 8-10 of the claim. It is indefinite about "the history to be additionally comprised of" because claim 1 has already recited "a history comprised of" and the transitional phrase "comprised of" has excluded any element not specified in claim 1. Therefore, the limitation "the history to be additionally comprised of" in claim 2 is indefinite.

7-2. Claim 3 recites the limitation "determining the history to be additionally comprised of a propagation of a tag value of each signal of the second subset" in lines 6-8 of the claim. It is indefinite about "the history to be additionally comprised of" because claim 1 has already recited "a history comprised of" and the transitional phrase "comprised of" has excluded any element not specified in claim 1. Therefore, the limitation "the history to be additionally comprised of" in claim 3 is indefinite.

7-3. Claim 4 recites the limitation "wherein a propagation of a tag value to the history is comprised of creating a copy of the tag value" in lines 1-2 of the claim. There is insufficient antecedent basis for this limitation in the claim because "a propagation of" a tag value has been removed from claim 1.

7-4. Claims 5 and 6 are rejected as being dependent on a rejected claim.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-3, 20, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Devadas et al., "An Observability-Based Code Coverage Metric for Functional Simulation", IEEE/ACM International Conference on Computer-Aided Design, November, 1996, pages 418-425.

9-1. Regarding claim 1, Devadas et al. disclose a method performed by a data processing system having a memory, comprising the steps of:

simulating an execution of an assignment statement of a hardware description language design specification in order to determine a logical value for a target signal of the assignment statement based upon a set of logical values for a set of input signals to the assignment statement (assignment statement, pages 422-423, IV. A. Tag Simulation, paragraph 3);

identifying a subset of the input signals having an observably controllable effect on the logical value of the target signal based upon the logical values of the input signals and a functional interrelation of the input signals (Some tags may not be activated by the functional test sequence if the statement in which the tag occurs is not reached, pages 422-423, IV. A. Tag Simulation, paragraph 3); and

determining a target tag value for the target signal comprising an identifier of the assignment statement and a history comprised of a tag value of each input signal that is a member of the subset of input signals (we determine if the tags on the variables on the right hand side of the statement are propagated to the variable on the left hand side. Tags are also injected for the assignment on the variable on the left hand side, pages 422-423, IV. A. Tag Simulation, paragraph 3).

9-2. Regarding claim 2, Devadas et al. further disclose:

the step of identifying further comprises identifying a second subset of a set of input signals to a conditional statement of the hardware description language design specification having an observably controllable effect upon whether the assignment statement is simulated, membership in the second subset being based upon a logical value for each of an input signal to the conditional statement and a functional interrelation of the input signals to the conditional statement (if statement, page 422, III. F.3 Tag Propagation through If Statement); and

the step of determining further comprises determining the history to be additionally comprised of a propagation of a tag value of each signal of the second subset (we determine if the tags on the variables on the right hand side of the statement are propagated to the variable on the left hand side. Tags are also injected for the assignment on the variable on the left hand side, pages 422-423, IV. A. Tag Simulation, paragraph 3).

9-3. Regarding claim 3, Devadas et al. further disclose:

the step of identifying further comprises identifying a second subset of a set of input signals to a conditional expression of a conditional statement of the hardware description language design specification having an observably controllable elect upon whether the

conditional expression is satisfied (control condition, page 422, III. F.3 Tag Propagation through If Statement); and

the step of determining further comprises determining the history to be additionally comprised of a propagation of a tag value of each signal of the second subset (we determine if the tags on the variables on the right hand side of the statement are propagated to the variable on the left hand side. Tags are also injected for the assignment on the variable on the left hand side, pages 422-423, IV. A. Tag Simulation, paragraph 3).

9-4. Regarding claim 20, a data processing system claim includes equivalent method limitations as in claim 1 and is anticipated using the same analysis of claim 1.

9-5. Regarding claim 21, a computer program product claim includes equivalent method limitations as in claim 1 and is anticipated using the same analysis of claim 1.

Allowable Subject Matter

10. Claims 4-6 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

11. Claims 7-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant's Arguments

12. Applicants argue the following:

(1) "McNamara is about controllability-based state coverage" (page 20, section 5.1, Amendment 1).

(2) "Grinwald is about controllability-based functional coverage" (pages 20-21, section 5.2, Amendment 1).

(3) "Parson does not even address the subject of coverage" (page 21, section 5.3, Amendment 1).

(4) "claim 1 is directed to 'identifying a subset of the input signals having an observably controllable elect.' No such identification of a subset is done in the Devadas reference since the Devadas reference is based upon the possibility of errors being propagated in accordance with an error model" (page 7, last second paragraph, Amendment 3).

(5) "claim 1 is directed to determining 'a history comprised of a tag value of each input signal that is a member of the subset.' In the Devadas reference, there is no way a tag can have a history that is comprised of a tag value of each input signal since the tag determined is composed of one of three possible states" (page 7, last paragraph, Amendment 3).

Response to Arguments

13. Applicants' arguments have been fully considered.

13-1. Applicants' arguments (1)-(3) are persuasive. The rejections of claims 1-21 under 35 U.S.C. 103(a) in Office Action dated April 7, 2004, have been withdrawn.

13-2. Applicants' argument (4) is not persuasive. As described at pages 422-423, paragraph 3 of section IV. A. Tag Simulation, Devadas et al. have disclosed, "After each assignment statement is evaluated, we determine if the tags on the variables on the right hand side of the statement are propagated to the variable on the left hand side. Tags are also injected for the assignment on the variable on the left hand side. Some tags may not be activated by the functional test sequence if the statement in which the tag occurs is not reached". In other words, after each assignment statement is evaluated, whether any tag will be propagated to the variable on the left hand side will be determined based on whether the tag occurs would be reached.

13-3. Applicants' argument (5) is not persuasive. For example, when only one of the variables on the right hand side is observable, i.e., only one member in the subset, the limitation "a history comprised of a tag value of each input signal that is a member of the subset" has been met by the disclosure of Devadas et al.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure.

Reference to Hoskote, U.S. Patent 6,484,134 B1 issued November 19, 2002, and filed June 20, 1999, is cited as disclosing property coverage in formal verification.

Reference to Fallah et al., "OCCOM: Efficient Computation of Observability-Based Code Coverage Metric for Functional Verification", Proceedings, Design Automation Conference, June 1998, pages 152-157, is cited as disclosing an efficient computation of observability-based code coverage metric.

15. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

16. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Herng-der Day whose telephone number is (571) 272-3777. The Examiner can normally be reached on 9:00 - 17:30.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Jean R. Homere can be reached on (571) 272-3780. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Herng-der Day H.D.
December 27, 2004

JEAN HOMERE
SUPERVISORY PATENT EXAMINER